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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Richard R. Hall

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EXAMINER

DINH, TUAN T

ART UNIT

PAPER NUMBER

2841

DATE MAILED: 10/06/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

AM

Office Action Summary

Application No.

09/884,778

Applicant(s)

HALL ET AL.

Examiner

Tuan T Dinh

Art Unit

2841

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 July 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-32 and 35-39 is/are pending in the application.
- 4a) Of the above claim(s) 1-20, 25 and 26 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 21, 22, 24, 27, 28, 31 and 36-39 is/are rejected.
- 7) ☒ Claim(s) 23, 29-30, 32, 35 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 27, 28, and 31 are rejected under 35 U.S.C. 102(b) as being anticipated by Reimann (U. S. Patent 4,663,497).

As to claims 27, 31, Reimann discloses a structure for interconnection between circuit layers as shown in figure 8 comprising:

a laminate (22 and 34) having a conductive inner plane (24,);

a conductive pad (42) on a surface (surface 28, column 4, line 21) of the laminate (22, 34), wherein a bottom surface of the conductive pad (42) is in direct mechanical contact with the surface (28) of the laminate (22, 34) (see figure 8);

a conductive element (38 and 40) having lower and upper portions, wherein the lower portion (38) is embedded into the laminate and the upper portion (40) extends above the surface of the laminate (see figure 8), wherein the conductive pad (42) circumscribes the upper portion of the conductive element (40), wherein the conductive

element (38, 40) electrically connects the conductive inner plane (24) to the surface of the laminate, wherein the lower and upper portion (38, 40) comprises conductive material (column 4, lines 7-11), and the conductive material of the lower portion (38) is selected from copper (column 4, line 7).

Regarding claim 28, Reimann discloses the opening (26). The limitation of "pressed into" is a method limitation in product claim. But the structure of the claim is identical to Reimann. Therefore, Reimann disclosed claim 28.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 21-22, 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lloyd ('523) in view of Watanabe et al. (U. S. Patent 5,319,159).

As to claim 21, Lloyd discloses the method of forming a conductive path within an insulator as shown in figures 1-6 comprising:

providing an opening or a hole (14, column 2, line 72) in the insulator (10, column 2, lines 65-67);

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pressing a conductive element (15 and 16, column 3, lines 9, and 30-32), see figure 4, into the opening (14) such that a portion of at least one end of the conductive element extends beyond a surface of the laminate;

applying a compressive pressure to the at least one end of the conductive element (15, 16), see column 3, lines 20-24 whereby the compressive pressure applied to the at least one end of the conductive element (15, 16) forms a contact pad (35, 37, column 3, lines 37-38) extending beyond a surface of the laminate (10), see figure 6, and

the conductive element includes an inner element (15) covered by an outer element (16).

Lloyd discloses the claimed invention, except for the insulator being a laminate. It is very well known to use laminated as an insulation to allow the insertion of internal layers such as conductive or insulating layers in order to control the coefficient of thermal expansion (CTE) and dielectric properties.

Reimann shows a laminate (22, 24) disclosed in figure 8.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to employ a laminate as taught by Reimann to modify the insulator of Lloyd in order to provide a CTE and dielectric properties for a lamination layer.

Regarding claim 22, Lloyd discloses the opening (14) is a hole.

Regarding claim 24, Lloyd discloses the conductive element is a cylinder.

6. Claims 36 is rejected under 35 U.S.C. 103(a) as being anticipated by Lloyd (U. S. Patent 3,601,523) in view of Reimann ('497).

As to claim 36, Lloyd discloses a method of forming a conductive path within an insulator as shown in figures 1-6 comprising:

providing an opening (14, column 2, line 72) in the insulator (10, column 2, lines 65-67);

pressing a conductive element (15, column 3, line 9) into the opening (14) such that a portion of at least one end (see figure 3) of the conductive element extends beyond a surface of the insulator (see figure 3);

applying a compressive pressure (heating plates 30, 31, column 3, lines 34-35) to the portion of the at least one end of the conductive element (pressing the heating plates to the powdered metal 16) wherein the compressive pressure applied to the at least one end of the conductive element (15) forms a contact pad (35, 37, column 3, lines 36-38) extending beyond a surface of the insulator (10).

Lloyd discloses the claimed invention, except for the insulator being a laminate. It is very well known to use laminated as an insulation to allow the insertion of internal layers such as conductive or insulating layers in order to provide internal connection of internal circuit formed inside and reduce strength.

Reimann shows a laminate (22, 24) disclosed in figure 8.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to employ a laminate as taught by Reimann to modify the insulator

of Lloyd in order to provide internal connections of internal circuits formed inside and reduce strength.

7. Claim 37 is rejected under 35 U.S.C. 103(a) as being anticipated by Curcio et al. (U. S. Patent 6,504,111) in view of Condensed Chemical Dictionary of Hawley's (hereafter CCD).

Curcio et al. discloses a structure as shown in figures 4-7 comprising:

a first laminate (12A) having a first conductive element (20A) embedded into the first laminate (into a through hole (14A), wherein a portion of the first conductive element forms at least one contact pad (22A, 22B, column 2, line 59) extending beyond a surface of the first laminate;

a second laminate (12B) having a second conductive element (20B) embedded into the second laminate (into a through hole (14B), wherein a portion of the second conductive element forms at least one contact pad (22C, 22D) extending beyond a surface of the second laminate; and

a bonding layer (36 including conductive adhesives 32A) between the first and second laminates, such that the contact pads (22A, 22C) are electrical connected, wherein the bonding layer comprises conductive metal filled thermosetting resin/polymer (column 3, lines 27-56).

Curcio discloses the claimed invention, except for specifying that the thermosetting resin/polymer is epoxy. Epoxy is one of the best-known thermo sets in the

electronic industry used in circuit boards. CCD shows epoxy resin as adhesives for composites and for metals glass, and ceramics disclosed in page 450, column 1.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have epoxy to provide the thermosetting resin/polymer of Curcio, as taught by CCD, because the epoxy is well known thermosetting material for use in the circuit boards for the purpose of providing a high coefficient of thermal expansion, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416.

8. Claims 38-39 are rejected under 35 U.S.C. 103(a) as being anticipated by Rosenthal et al. (US Patent 3,105,729) in view of Reimann ('497).

As claims 38-39, Rosenthal et al. discloses a method of forming a conductive path within an insulator (20, column 2, lines 34-35) as shown in figures 5-6 comprising:

providing a conductive sphere element (22, column 2, line 36);

projecting the conductive element (22) toward a surface of the insulator (see figure 5), note: the conductive element (22) projected toward a surface of the laminate (20), which have precut by two slits (25, 26) formed a cutout or cavity (21);

impacting the surface of the insulator by the conductive element (22), wherein said impacting forms a hole (30), see figure 6, in the insulator such that the entire conductive element provided in the providing step becomes embedded within the hole.

Rosenthal et al. discloses the claimed invention, except for the insulator being a laminate. It is very well known to use laminated as an insulation to allow the insertion of internal layers such as conductive or insulating layers in order to provide the coefficient of thermal expansion (CTE) and dielectric properties.

Reimann shows a laminate (22, 24) disclosed in figure 8.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to employ a laminate as taught by Reimann to modify the insulator of Rosenthal et al. in order to provide a CTE and dielectric properties for a lamination layer.

Allowable Subject Matter

9. Claims 23, 29-30, 32, and 35 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

For claim 23, the reference of Reimann cited in the previous Office actions does disclose a method for forming a conductive path having a conductive element forming a conductive pad extending beyond a surface of a laminate, further, Rosenthal et al. (US 3,105,769) shows a sphere conductor (22) embedded into an insulator (10), but not extended beyond a surface of the insulator. However, they do not teach or render obvious in combination of the method having the conductive element, which is a sphere, formed the conductive pad and extended beyond the surface of the laminate, and a top surface of the conductive pad is coplanar with a top surface of the upper portion of the

conductive element. Also, there is no teaching or suggestion to modify these references to include this limitation.

For claims 30, 32, and 35, Reimann does disclose a structure having upper and lower portion of a conductive element embed into the laminate. However, Reimann do not disclose or further in view of any references cited that they fail to teach or render obvious in combination of part of the upper portion of the conductive element that extends above a conductive pad. There is no teaching or suggestion to modify these references to include this limitation.

Response to Arguments

10. Applicant's arguments filed July 12, 2004 have been fully considered but they are not persuasive.

Applicant argues:

(a) Regarding claim 27, Reimann ('497) does not teach "the lower and upper portion of the conductive element, each comprises a conductive material."

It is incorrect. Examiner discloses in the previous Office action of portion #2, page 2 that the lower and upper portion of the conductive element, each made by conductive material, see column 4, lines 7-11, the lower portion (38) made by a copper, which is a conductive material, and the upper portion (40) made by metallic/conductive resist, which is the conductive material. Even though, copper is different from metallic/conductive resin, but they are conductive material. Further, Applicant does not

specifically claimed the specific type of the conductive material in claim 27. Therefore, it is believed the Reimann reference disclosed these limitations as discussed above.

For claim 29, Reimann ('497) in view of Curcio does not teach "a top surface of the conductive pad is coplanar with a top surface of the upper portion of the conductive element."

Examiner agrees. The combination of Reiman in view of Curcio does not apply to the limitations in claim 29.

For claim 36, Lloyd in view of Reimann is not persuasive because the insulator (10) of Lloyd can not modified a laminate as shown in figure 8

Examiner disagrees. Lloyd discloses a double side circuit board (9) having a insulator layer (10) formed between two conductors (11 and 12). Reiman shows a laminate (22 and 24) in figure 8 formed between layers (42 and 34). It would have been obvious to one having skill in the art to employ a laminate of Reimann for modifying a single layer (the insulator layer) of Lloyd in order to provide internal connections of internal circuits formed inside and reduce strength. Therefore, it is believed that claim 36 is proper under rejected by Lloyd in view of Reimann.

For claim 37, Curcio does not disclose "the bonding layer comprises conductive metal filled epoxy."

Examiner disagrees. Curcio discloses an electrical conductive adhesive 32A as defined as conductive metal filled thermosetting polymer or conductive metal filled thermosetting resins. The thermosetting polymer or thermosetting resins are one of the types of an epoxy resin family (see an attached paper of Hawley's Condensed

Chemical Dictionary was mailed and attached with the previous Office action). Thus, the conductive metal filled thermosetting polymer/resin in the other word as named as conductive metal filled epoxy as well know in the art. Therefore, it is believed that claim 37 is proper by Curcio reference in view of Condensed Chemical Dictionary of Hawley's.

For claim 38, Rosenthal does not disclose "impacting the surface...embedded within the hole." Examiner disagrees. Rosenthal discloses an aperture (21), the aperture is not a hole, and conductor (22) insert into the aperture (21) with two slits (25-26) to form the conductors into a hole (30). The hole (30) is different with the aperture (21) because the aperture does not get through from the top to the bottom of the panel. There fore, it is believed claim 38 is proper by Rosenthal.

Regarding claim 21, Lloyd in view of Watanabe does not teach "a portion of at least one end of the conductive element extends beyond a surface of the laminate" and "applying compressive pressure...the surface of the laminate."

Examiner disagrees. Lloyd clearly shows in figure 4 that an end (16) of conductive element (15) that pressed by a ram (17) into a hole (14), then after the ram is remove, the end of the conductive element extending beyond the surface of layer (10). Further, by applying two pressure force (30,31) on the end of the element (15) so that the end form a pad (35, 37).

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

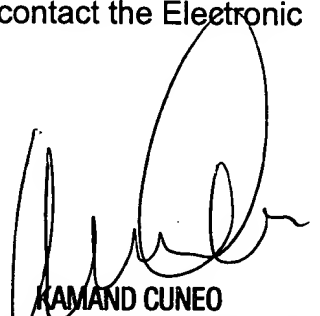
A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tuan T Dinh whose telephone number is 571-272-1929. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kammie Cuneo can be reached on 571-272-1957. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Tuan Dinh
September 22, 2004.



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